WINTER SEVERITY AS A CLIMATIC FACTOR.

By OTTO BASCHIN.

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It is commonly noted that cold seems more severe when it is accompanied by a strong wind. This led Vincent, in 1890, to develop an equation expressing a relation between H, the skin temperature, L, the air temperature, S, the difference between the temperature in the sunshine and in the shade, and V, the wind speed, as follows:

$$H = 26.5 + 0.3L + 0.2S - 1.2V.$$

From this equation he obtained the limits of the sensation of "very hot" and "very cold." That is, when H was greater than 37.5° C. it was considered "very hot," and when less than 22° C. it was considered "very cold."

Later G. Bodmann expressed an index of weather severity as a function of air temperature and wind velocity, as follows:

$$S = (1 - 0.4t)(1 + 0.272v),$$

in which S is the index of severity, t the temperature, and v the wind velocity. A table, giving the values of t and v corresponding to various values of S, is presented together with another showing the values of S, t, and v, for various localities during the time of severest weather. The author points out that not enough attention has been given this matter by climatologists, and points to the brief and "easily misunderstood" reference in Hann's *Handbuch der Klimatologie* and the brief tables of "mean temperatures" and "mean wind speed."—*C. L. M.*

MOUNT KÉNYA: NOTES ON THE GEOGRAPHY OF AN EQUATORIAL SNOW PEAK.

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There are considerable differences in zonal distribution between the eastern and western sides of the mountain, especially in the lower forest zone, which is economically the most important. On the west the forest begins at an elevation of 7,000 to 7,500 feet. For the northwest Alluaud and Jeannel place it as high as 7,870 feet.[1] On the southeast the lower edge of the forest begins about 6,000 feet. Here it is much denser, and the place of the distinctive juniper (cedar) of the west is taken by great camphor trees. The drier west appears to have suffered greatly from fire, and the higher altitude at which the forest begins may be due in part at least to the destructive grazing fires of the Masai. Evidently precipitation is the dominant factor controlling the differences of the vegetational zones. Kénya is exposed to prevailing easterly winds (southeast trade, northeast monsoon). Hutchins estimated that, where the rainfall of the southeastern slope was 80 to 120 inches a year, that of the west was 50 to 90 inches.

The most recent observations on Kénya by Capt. G. St. J. Orde Brown[2] emphasize the extreme humidity of the mountain, a fact which explains the low limit of snow (about 14,500 feet on the southeast), as von Höhnel, Teleki's companion, comments, lower than that of Kilimanjaro.[3] For at least nine months of the year Kénya is "covered with mist, varied by heavy rain;" in fact the only months when finer weather can be depended on are February and early March. A marked consequence of the heavy rainfall is seen in the high degree to which the south-eastern face is eroded, the gorges being cut much more deeply than on the other sides. * * *."

[1] Le Mont Kénya en Afrique Orientale Anglaise, Rev. Gén. des Sci., July 15, 1914, pp. 639-644.

[2] The Southeast Face of Mount Kénya, Georg. Journ., June, 1918, pp. 389-392.

[3] Ostäquatorial-Afrika, zwischen Pangani und dem neuentdeckten Rudolph-See, Ergänzungsheft zu Petermanns Mitt. No. 99, 1890.

THE GEOGRAPHICAL BARRIERS TO THE DISTRIBUTION OF BIG GAME ANIMALS IN AFRICA.

By EDMUND HELLER, Naturalist.

[Author's summary, *Geographical Review*, October, 1918, p. 319.]

It is climate that exerts the chief control over the distribution of animals in equatorial Africa. The five zones which we have here employed in defining the ranges of game animals and native tribes have been established on a climatic basis. Coincident with climate are distinctions of flora on which the animals are dependent for food and protection. Temperature first and then moisture are the most important climatic elements. Temperature is dependent chiefly on altitude, and our zones, inasmuch as they are primarily defined by temperature, have very definite altitudinal boundaries and lie one above another. In accord with the banded orographical structure of the region we find the life zones disposed in ribbonlike arrangement and paralleling the coast in a general way the whole length of the eastern side of the continent. Summarizing the five life zones briefly, we have first the narrow coast zone rising from sea level to 500 feet or so. Above this the great desert, or nyika, zone extends from 500 feet to an altitude of 3,000 feet. Above the desert the highland veld rises from 3,000 to 8,000 feet, its altitude giving it a cooler and moister climate. Rising still higher above the plateau there is a highland forest area on mountain slopes and summits covering the altitudes between 8,000 to 11,000 feet, where the climate is decidedly moister and cooler. The area lying above the tree zone, which is alpine in the character of its plant growth and climate, is infinitesimal in Africa in comparison with the other zones. In Uganda we have an area or zone, the tropical forest, which is dependent on soil conditions rather than altitude. Here we find a dense tropical forest covering certain areas within a grass veld region. To some extent this area is artificial, the grass veld having been extended by native agricultural methods at the expense of the forest area. Within these zones are two important river barriers, the Nile and the Tana, which subdivide the nyika zone, as their waters form important barriers to big game mammals. As a barrier these rivers are here only of great importance to the distribution of big game, smaller mammals being much less affected. Reptiles, birds, other animals, and vegetation are scarcely affected at all by these rivers in their distribution, though they are subject to the zonal or climatic barriers quite as much as are big game mammals. There is no region in the world where large mammals have been so limited in their distribution by rivers as in equatorial Africa.